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QUALIFICATION OF LAUNCH SUPPORT AND FACILITY COMPONENTS STANDARD FOR

ENGINEERING DEVELOPMENT DIRECTORATE

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NASA

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QUALIFICATION OF LAUNCH SUPPORT AND FACILITY COMPONENTS STANDARD FOR

Approved By:

James D. Phillips
Director of Engineering Development

JOHN F. KENNEDY SPACE CENTER, NASA

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ABBREVIATIONS AND ACRONYMS

CIL	critical items list
CSD	component specification drawing
DE	Engineering Development Directorate
e.g.	for example
FEA	Failure Effects Analysis
FMEA	Failure Modes and Effects Analysis
GIDEP	Government-Industry Data Exchange Program
GSE	ground support equipment
i.e.	that is
KAPL	Kennedy-approved parts list
KSC	John F. Kennedy Space Center
QPL	qualified products list
SFPA	Single Failure Point Analysis
SFP	Single Failure Point
STD	standard

QUALIFICATION OF

LAUNCH SUPPORT AND FACILITY COMPONENTS

STANDARD FOR

This standard has been approved by the Engineering Development Directorate (DE) of the John F. Kennedy Space Center (KSC) and is mandatory for use by KSC and associated contractors.

1. SCOPE

This standard establishes the methods for accomplishing qualification of those components located in nonconventional space-program-oriented facilities and equipment. This standard also provides the criteria and rationale to be used in determining which components require qualification. Under no circumstances shall any part of this document be construed as an attempt to establish a qualified products list (QPL).

The basic purpose of a formal component qualification program is to verify that components meet the design specification requirements necessary to ensure operational suitability in their anticipated environments for their full-use cycle. The purpose of this standard is to ensure that critical single failure point components and other components that have significant failure impact are qualified.

2. APPLICABLE DOCUMENTS

The following documents form a part of this document to the extent specified herein. When this document is used for procurement, including solicitations, or is added to an existing contract, the specific revision levels, amendments, and approval dates of said documents shall be specified in an attachment to the Solicitation/Statement of Work/Contract.

Governmental

Standards

John F. Kennedy Space Center, NASA

KSC-STD-128	Preparation of Test Reports
KSC-STD-164	Environmental Test Methods for Ground Support Equipment

Publications

John F. Kennedy Space Center, NASA

KSC-DE-512-SM	Guide for Design Engineering of Ground Support Equipment and Facilities for Use at Kennedy Space Center

3. REQUIREMENTS

All facilities, systems, and equipment will generally be subjected to a criticality assessment as specified in KSC-DE-512-SM. As a result of this process, certain components will be identified as requiring qualification.

3.1 Components Requiring Qualification. - Qualification of components is normally limited to those components that are used in nonconventional space-program-oriented facilities and equipment and are under the design responsibility of KSC. Components shall be considered as candidates for qualification when they satisfy one or more of the following criteria. Qualification is mandatory for a. and highly desirable for b. through f.

a. A component has been assessed as a critical item (or single failure point) by Failure Modes and Effects Analysis (FMEA) and the item appears on the Critical Items List (CIL).

b. Failure of the component would result in sufficient operation degradation to cause the system, subsystem, or assembly to perform at a point lower than the minimum acceptance level.

c. The component is classified as a development item with little or no reliability history.

d. The component has stringent performance requirements because of its application.

e. The component has a high replacement cost.

f. A severe schedule impact may result from failure of the component or a substitution.

Qualification is not normally required for any component that is part of the conventional (institutional) facility or its equivalent. These components, which are obtained through Government or approved commercial standards, are normally accepted as qualified components when the design is accepted. If a formal qualification test program is initiated, the component qualification plan and status shall be part of the design review milestone package.

3.2 Level of Qualification. - Qualification shall normally be conducted at the component level; however, it is acceptable for a component contained in a unique assembly to be qualified on the basis of qualification of the higher assembly (i.e., a component in a control panel assembly for valve operation in a critical system). Qualification of the higher assembly (control panel assembly) shall result in an acceptable qualification of the component. Qualification of a component in this manner is restricted to the specific part application and environment for this assembly and does not establish qualification for other usage.

3.3 Component Qualification Plan. - The cognizant design engineer shall prepare a component qualification plan only if he plans to do actual component or higher level assembly qualification testing. The component qualification plan shall include as a minium the following information:

a. The components that are to be subjected to qualification

b. The reasons for qualification (see paragraph 3.1)

c. The test requirement specifications to which components are to be qualified, including rejection criteria

d. The general schedule for the implementation (including completion) of qualification tests

e. The number of specimens or the percentage of the total to be tested for each component, when applicable

3.4 Priority of Qualification. - A component qualification program shall be structured to emphasize the timely and successful qualification of those components that appear in the CIL. The qualification of these components shall have precedence as follows: Criticality 1, 1S, 1R, and 2.

The following criteria shall be used to determine those components needing qualification that have the next priority:

a. Failure of the component would cause sufficient operation degradation to cause the system, subsystem, or assembly to perform at a point lower than the minimum acceptance level.

b. The component has stringent performance requirements because of its application.

c. The component has a high replacement cost.

This priority determination shall be used when establishing test plans and test schedules.

3.5 Duplication. - A component qualification program shall be structured to provide the most economical and effective use of component qualification. Maximum use will be made of existing qualified and/or standardized components; e.g., Kennedy-approved parts list (KAPL), component specification drawing (CSD), and Government-Industry Data Exchange Program (GIDEP). Data from previous component qualifications will be utilized. Previous qualifications will not be duplicated. Qualification will primarily cover areas of new and/or increased applications of environments. The applicable history and methods of prior qualification shall be referenced or incorporated into the test plan.

3.6 Extension of Qualification. - Qualification of a component shall apply only to a component manufactured by the same manufacturer at the same plant that procured the qualification sample. Qualification can, however, be extended to the same component produced by the same manufacturer at other plants, to the same component produced under license from the original manufacturer, or to an equivalent component produced by another manufacturer. Extension of qualification is determined by the following criteria:

a. By examination or test of the components from other plants or manufacturers, the components are ascertained to meet the requirements for equivalent components (see paragraph 3.7) in all aspects.

b. A review of the manufacturer's engineering data, specifications, drawings, etc., ascertains the component is essentially equal. A component is essentially equal when it is determined by engineering analysis that there is no significant difference. An example of a significant difference is the use of materials that are not compatible with the required environment or service application, or the position of the parts within the component that would be sensitive to various induced environments are different.

c. The quality control and processing at other plants or manufacturers are such that the components produced there are equal in all respects to the qualified components.

In the event a component does not meet all these requirements, the manufacturer may be allowed to modify the component, control, or processing in order to satisfy these requirements. At that time, an extension will be granted provided no other manufacturer has a suitable component.

3.7 Equivalent Components. - Components shall be accepted to be equivalent or equal when the replacement item is functionally interchangeable with the originally qualified component. This includes physical, operational, and environmental requirements as contained in the design specification.

3.8 New Design Applications. - Components qualified in accordance with a component qualification program shall be considered qualified for use in applications having design specification requirements less severe or equal to those for which the component was originally qualified.

3.9 Standard Military Parts. - Components that have been qualified under other Government programs shall be considered qualified if the previous qualification tests meet KSC standards. If a standard military part that is to be used in design does not meet KSC qualification test requirements, then only those additional qualification tests required to satisfy a particular system usage shall be accomplished to qualify a component in accordance with a component qualification program.

3.10 Commercial Hardware Qualification. - Qualification requirements for commercial hardware are satisfied when such items are selected by the designer as acceptable for the intended use (see section 4). When commercial hardware is selected for critical systems application, the item must meet all qualification requirements of section 4 of this document.

3.11 Destructive and Nondestructive Testing. - Certain tests within the scope of qualification testing performed in conjunction with a component qualification program shall be considered destructive. Test components will not be installed in operational systems. Destructive tests include, but are not limited to, the following:

a. Burst tests

b. Fatigue or life cycle tests

c. Overstress tests

d. Corrosion tests that result in severe deterioration of major parts of a component

e. Vibration tests that produce deformation in or reduction in strength of critical parts of a component

Other types of tests accomplished during qualification testing shall be considered nondestructive. Components in this category may be refurbished, as required, and accepted as usable. This type of test includes, but is not limited to, the following:

a. Flow or determination of a valve C_V

b. Pressure tests (hydrostatic/pneumatic)

c. Surge tests

d. Voltage drop tests

e. Electrical resistance tests

f. Proofload Testing

3.12 Environmental Conditions. - Tests shall be conducted to the maximum extent practicable to ensure operational suitability of the component for the anticipated environmental conditions to be encountered during its required usage. Consideration shall be given to natural and induced environments and to combinations and sequences of stresses. KSC-STD-164 will be used as a guide to define environmental conditions for testing. When planning tests, emphasis shall be given to simulation of the most adverse environments required for a specific component during operational use. To accomplish

environmental testing, the cognizant design engineer shall be responsible for selection of the level of environmental conditions to be tested, required operating time or cycles for testing, and the test procedure.

Environmental conditions that can adversely affect the qualification of a component include:

a. Temperature (high, low, or shock)
b. Shock
c. Acoustics
d. Vibration
e. Salt fog
f. Rain
g. Icing
h. Solar radiation
i. Explosive gas/vapor atmosphere
j. Humidity
k. Sand and dust
l. Fungus
m. Electromagnetic field
n. Liftoff blast

3.13 Review of Qualification Requirements. - A review shall be made when a specification is revised or amended. In this review, consideration shall be given to the possibility that changes in component application, advances in manufacturing techniques and quality control methods, or improvements in testing apparatus and techniques may have reduced or eliminated some areas of the qualification requirements for that component. This is not applicable to standard military parts or commercial hardware.

3.14 Requirements for Requalification. - Requalification of a component can be required under any of the following conditions:

a. The manufacturer has modified the component or changed the material or processing to the extent that the validity of previous qualification is questionable.

b. The design specification requirements have been revised enough to affect the previous qualification of the component.

c. When deemed necessary to ascertain that the product continues to meet all of the design specification requirements.

d. When inspection, test, or other data indicate that a more severe environment, time and cycle duration, or other operating condition exists than that to which the component was originally qualified.

e. When an actual failure of a critical component has occurred and failure analysis indicates a possible component design problem.

3.15 Revocation of Qualification. - The qualification of a component may be revoked by the cognizant design engineer under any of the following conditions:

a. The component offered under contract does not meet the requirements of the specification.

b. The manufacturer has discontinued manufacture of the component.

c. The manufacturer or distributor requests that the component no longer be qualified.

d. The conditions under which qualification was granted have been violated.

e. The requirements of a revised specification differ sufficiently from the previous issue that existing test data are no longer applicable for determining compliance of the component with the specification.

f. Failure of manufacturer to notify qualifying activity of design change.

3.16 Sample Size.- The cognizant design engineer shall be responsible for determining the sample quantity of each component for qualification testing.

3.17 Testing Surveillance. - The cognizant design organization is responsible for surveillance of qualification testing. Normally, this function is delegated to Government quality control personnel. Surveillance is required to ensure conformance to test requirements, to ensure testing is accomplished under controlled conditions, and to ensure test results are accurately recorded. Definite lines of communication must be established between the surveillance personnel and the design organization so problems encountered in testing are immediately transmitted to design for analysis and resolution.

3.18 Failure During Testing. - Any failure of a test specimen under specific conditions during qualification test shall disqualify the entire class of components (all components made to the same specifications as the qualification test component). Qualification testing can be continued after the failure has been analyzed and adequate corrective action has been taken to remove the

reason for failure. If a failure is determined by engineering analysis to be caused by inadequate design or conditions of manufacture that the manufacturer cannot correct, the component shall not receive qualification. The amendment of test procedures or changing of requirements, specifications, etc., is the responsibility of the cognizant design engineer.

3.19. Deviations. - When a failure or an out-of-specification condition occurs during the functional or environmental phase of qualification testing, the proper deviation documentation shall be provided to justify the immediate corrective action taken. The test deviation document shall be prepared to indicate acceptance of the deviation based upon an engineering analysis of usage requirements. Test deviations shall require the approval of the cognizant engineer or a designated representative.

3.20 Waivers. - If engineering analysis indicates a waiver to the specified qualification requirements is desirable, the proper waiver documentation shall be prepared, giving adequate justification, for approval by the cognizant design engineer or a designated representative.

4. QUALIFICATION

4.1 Methods of Qualification. - All components identified in accordance with paragraph 3.1 shall be qualified by one of the following methods:

4.1.1 Qualification by Testing. - When qualification data is not available, components shall be qualified by testing to demonstrate operational suitability for a specific application. The systems engineer uses at least three types of tests during the design and development of new equipment to ensure technical confidence in the component. A functional test demonstrates that the part, subsystem, or system operates (or does not operate) as specified; i.e., a hardware demonstration verifying that a concept is feasible. An acceptance test demonstrates the conformance (or nonconformance) of an end item to design or specification as a basis for contractual acceptance. A verification test demonstrates that a part, subsystem, or system which has previously been accepted (wholly or partially) performs (or does not perform) as required.

At this point in the development cycle, if a component is considered a candidate for qualification testing based on paragraph 3.1 criteria, then tests shall be conducted to demonstrate the part, subsystem, or system is qualified to perform as required. Qualification testing normally includes testing at accelerated conditions of environment, functions (pressures, voltages, flows, etc.), tolerances, life cycles, and time, and may include destructive tests and inspections of the disassembled component. When testing is required, specifications shall be prepared detailing the specific test requirements. Qualification testing shall be planned based on the following criteria:

a. Acceptance tests shall precede all qualification tests.

b. Electronic components that have a history of parameter variation with time shall be subjected to burn-in tests before qualification testing and shall be subjected to functional checks during qualification testing at specified intervals and conditions.

c. Simulation of environments during component qualification testing shall be based on the concept that all components shall demonstrate their capability to withstand the deleterious effects of the environment, both natural and induced.

d. All natural environments, such as humidity, salt fog, rain, sand and dust, fungus, and solar radiation shall be considered for inclusion in testing. All induced environments, such as acoustics, shock, vibration, high temperature, low temperature, liftoff blast, electromagnetic field, and explosive gas/vapor atmosphere, shall also be considered for inclusion.

e. The environmental levels and sequence shall be derived from the most severe conditions that can be imposed and shall be performed as defined in the qualification specification.

f. Testing shall be performed on those components that have an inherent sensitivity to a particular environment. KSC-STD-164 will be used as a guide to define the environmental conditions required for testing. The sensitivity shall be based upon the failure mode and mechanism of the item and upon the effects of the environment on its operational strength and endurance characteristics. If the sensitivity to a particular environment cannot be positively determined, the item shall be subjected to testing in the environment.

g. Testing to a particular environment may be waived when analysis demonstrates that the environmental level is reduced through protective measures to a point that it is not a limiting factor.

h. When qualification testing is to be performed to the requirements of specifications, all test items, excluding those used as controls, shall be exposed to the complete environmental test sequence before undergoing a life test.

When a component successfully meets these testing criteria, it shall be considered qualified for use in the application for which it was tested.

4.1.2 Qualification by Similarity. - Components shall be considered qualified by similarity when the following requirements are successfully met:

a. The component is currently rated for the environmental levels of the intended application.

b. The similar component is designed or procured to equivalent specifications required for the compared component.

c. The similar component is fabricated by the same manufacturer with similar processes and quality control.

d. The differences between both components are identified, and it is determined that the differences have no effect on operational suitability.

4.1.3 Prior Qualification. - Components shall be accepted as qualified upon confirmation that the component was formerly qualified to the necessary environmental and testing levels. The data used for this evaluation must meet the following criteria:

a. The data relates to the same component from the same manufacturer.

b. The data is from a creditable source and is documented and available.

c. The data applies to tests performed at stresses equal to or greater than application requirements.

d. The data is current and/or demonstrates favorable operational history.

4.1.4 Qualification by Usage and Analysis. - Components shall be considered qualified by usage and analysis when an engineering analysis reveals the item is acceptable for use without a formal qualification test. Before acceptance, such items must be successfully evaluated for:

a. Usage analysis on previous programs

b. Postlaunch inspection

c. Postlaunch data evaluation

d. Construction characteristics

e. Electrical environment

f. Mechanical mounting

g. Interference environments

h. Service life

i. Design safety margins

j. Standard commercial usage

4.1.5 Qualification by Higher Level Assembly Testing. - Components within an assembly shall be considered qualified by higher level assembly testing when:

a. The higher assembly is qualified by test.

b. Such qualification is restricted to the specific part application within the higher assembly.

NOTE

Qualification of the part for other applications is not established.

Consideration shall be given to elimination of those tests that can be conducted as part of higher assembly tests. This includes assembly qualification tests and subsystem or system qualification tests.

4.2 Qualification of Critical Items. - Components that have been identified by an FMEA and that appear on the CIL shall require qualification by similarity, prior qualification, or formal testing. Critical components shall be analyzed for potential design weakness. The degree and severity of environmental testing under operational loads shall be determined by such factors as the capability of the testing to demonstrate acceptability to design specifications, cost effectiveness, risk taken by less demanding testing, and the existing engineering confidence in the test candidates.

4.3 Qualification Test Categories. - Qualification tests shall belong to one of the following categories.

4.3.1 Structural Tests. - Structural tests shall be performed to determine the ability of components to withstand predicted or measured static and dynamic forces that may be encountered during testing and launch activities.

Structural tests (such as proof/pressure tests; e.g., hydrostatic/pneumatic) shall be performed to determine the following, as applicable:

a. Causes of structural failure (burst testing)

b. Effects of forces internally applied or externally applied

c. Effects of normal environments on the components

d. Safety factors, failure characteristics, and design limitations by the proper sequencing and application of overstress

4.3.2 Dynamic Tests. - Dynamic tests shall be performed to determine the dynamic characteristics under conditions simulating operational conditions insofar as practical. This will include satisfying the minimum acceptance level for any fluid flow. When design changes are made that significantly affect dynamic characteristics, a dynamic test shall be performed on the modified configuration.

4.3.3 Environmental Tests. - Environmental tests shall be performed in accordance with KSC-STD-164 to determine that items perform to design specifications under the equipment use environment.

4.3.4 Compatibility Tests. - Compatibility tests shall be performed to determine that the components are physically, functionally, and operationally compatible with other components and media encountered during their intended usage.

4.3.5 Life Cycle Tests. - Life cycle tests shall be performed, when applicable, to verify or determine the useful life of a component. These tests shall be conducted under the design parameters and environmental conditions that will be imposed on the installed component.

5. REPORTS

5.1 Test Requirements. - Test requirements documents will be prepared by the cognizant design engineer to define the testing necessary to determine that the component satisfies the requirements for service in ground support equipment systems. The documents shall include as a minimum, but are not limited to, the following:

a. Identification of the component

b. Function of the component

c. Operating parameters

d. Environmental tolerances

e. Detailed test requirements

f. Sequence of testing

KSC-STD-164 will be used as a guide to define environmental conditions for testing.

5.2 Test Procedures. - For each component to be tested, the test agency will prepare a test procedure based on the test requirements. All test procedures will be approved by the cognizant design engineer prior to the initiation of test activity.

5.3 Test Reports. - The testing agency shall prepare a final test report for each test article in accordance with KSC-STD-128. The responsible design engineer will review, approve, and publish test reports.

5.4 Qualification Listing. - The design agency shall maintain a qualified components listing that identifies which GSE components are considered as being qualified and that maintains qualification status.

6. NOTES

6.1 Intended Use. - This standard is intended to be used to assist design organizations in formulating program plans, methods, procedures, test criteria, and requirements for those components requiring qualification under a component qualification program.

6.2 Definitions. - For the purpose of this standard, the following definitions shall apply.

6.2.1 Acceptance Tests. - Tests to determine conformance to design or specifications as a basis for acceptance.

6.2.2 Ambient Conditions. - Environmental conditions, such as pressure, temperature, humidity, etc., that are normal for the location under discussion.

6.2.3 Cognizant Design Organization or Design Engineer. - The organizational unit of KSC or the NASA or contractor design engineer that has design or managerial responsibility for the specified work.

6.2.4 Commercial (Off-the-Shelf) Hardware. - Commercial (off-the-shelf) items or components that satisfy all of the following:

a. Have been or will be made to released drawings

b. Do not require research, development, or modification

c. Can be procured by name, catalog, or serial number

d. Are compatible with the safety or reliability of the ground or flight system as demonstrated by engineering analyses and/or testing.

6.2.5 Component. - The smallest assembled item identifiable as a complete, functioning, hardware entity that performs a distinctive function in the operation of an item of equipment or a system.

6.2.6 Conventional Facilities and Equipment. - Conventional (institutional-support) facilities and equipment comprise office buildings, laboratory buildings, auditoriums, libraries, warehouses, cafeterias, shops, roads, walkways, parking lots, utility systems, and other items similar in design and application whose structures are characterized by well-established design precedents. Propellant facilities and such controlled systems as hoisting equipment and cranes are not considered conventional facilities or equipment.

6.2.7 Critical Item (GSE Hardware). - An item is critical if it is:

a. A Criticality 1, 1S, or 2 single failure point

b. Criticality 1R because:

(1) A redundant item is not capable of being checked and verified during normal ground operations.

(2) The loss of a redundant item is not readiy detectable by the ground crew.

(3) A redundant item can be lost by a single credible cause such as contamination or routing redundancy through a single connector.

6.2.8 Critical System. - A GSE system assessed as critical because of loss of overall system function or improper performance of the system function that could result in loss of life, loss of vehicle, or damage to a vehicle system.

6.2.9 Criticality Category. - A classification according to the potential worst-case effect of a failure. Criticality assignments are based on the following definitions:

Criticality	Potential Effect
1	A single failure that could cause loss of life and/or vehicle.
1S (GSE only)	A single failure in a safety or hazard monitoring system that could cause the system to fail to detect, combat, or operate when needed during the existence of a hazardous condition and/or vehicle.
1R	Redundant hardware items, the failure of which could cause loss of life or vehicle.
2 (GSE)	A single failure that could result in loss of or damage to a vehicle system.
3	All other failures.

6.2.10 Deviation. - A specific authorization granted before the fact to depart from a particular requirement of specifications or related documents.

6.2.11 Environmental Test. - Any test performed under environmental rigors other than ambient for the prime purpose of verifying the quality of ground support equipment.

6.2.12 Failure. - The inability of a system, subsystem, component, part, or material to perform its required function within specified limits, under specified conditions, and for a specified duration.

6.2.13 Failure Modes and Effects Analysis (FMEA). - A procedure by which each potential failure mode of each component within a system is analyzed to determine the effects thereof on the system/flight hardware/personnel safety and to classify each potential failure mode according to its severity.

6.2.14 Failure Mode. - A description of the manner in which an item can fail.

6.2.15 Functional Test. - A test performed to demonstrate that the operation of the item meets or exceeds its performance requirements.

6.2.16 Government-Industry Data Exchange Program (GIDEP). - An operation sponsored by Government and industry to obtain test reports and failure analysis reports on parts and associated materials from Government agencies and contractors who make or sponsor these tests. GIDEP is concerned with the acquisition, storage, retrieval, and dissemination of: (1) reliability and qualification test and usage information on parts, materials, and components, and (2) test equipment calibration procedures. Primary emphasis is placed on the results of user tests rather than vendor tests.

6.2.17 Ground Support Equipment (GSE). - All equipment necessary to support the operations of receiving, handling, assembly, test, checkout, and launch of space vehicles.

6.2.18 Induced Environment. - An environment, other than natural, that is artificially created, such as shock, vibration, acoustics, etc.

6.2.19 Natural Environment. - An environment caused by nature, such as solar radiation, temperature, rain, salt fog, humidity, etc.

6.2.20 Nonconventional Facilities and Equipment. - Nonconventional facilities and equipment are program oriented or experimental in nature and comprise test facilities, launch complexes, operational or research facilities, towers, and similar special-purpose facilities or equipment whose structures are characterized by unusual or inadequately defined loading conditions, a lack of established design precedent, or frequent modifications to support changes in operational procedures.

6.2.21 Nondestructive Testing. - Testing of a nature that does not impair the usability of the item.

6.2.22 Qualification Tests. - A series of functional tests to be performed under simulated environmental conditions exceeding mission requirements. The test article used shall be identical with the proposed installed equipment. The purpose of these tests is to demonstrate, prior to operational usage, that the equipment will function satisfactorily in the anticipated environment for the time or cycles required.

6.2.23 Sample Size. - The number of units in a sample. Also used in the sense of the number of observations in a sample.

6.2.24 Single Failure Point (SFP). - Any single item of hardware, the failure of which would lead directly to loss of life, vehicle, or mission. For GSE, an SFP also includes damage to a vehicle system. Where safety considerations dictate that an abort be initiated when a redundant item fails, that item is also considered a Single Failure Point.

6.2.25 Subsystem. - A major group of equipment that is functionally independent within a system.

6.2.26 System. - Any combination of piece parts, components, assemblies, and subsystems joined together to perform a specific operational function or functions.

6.2.27 Waiver. - A written authorization, granted after the fact, for use or acceptance of an article that does not meet the specified requirements.

NOTICE. When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Custodian:

NASA - John F. Kennedy Space Center

Preparing Activity:

John F. Kennedy Space Center
Mechanical Engineering Division
Engineering Development Directorate